Cogeneration is the use of one energy source—usually coal, oil or gas—to produce both process energy and electricity. For example, a school that burns coal to heat its buildings can often fit a small generator into the system to tap the excess steam energy and generate a portion of the electricity it needs. Or a mine using diesel engines to run ore processing equipment can use excess engine heat to drive a small generator. Cogeneration turns waste heat into power, conserving natural resources and reducing operating expenses.

The Energy Systems Division of Thermo Electron Corporation, Waltham, Massachusetts specializes in custom design of cogeneration systems. Many companies manufacture the components of the cogeneration system—boilers, turbines, valves, generators, piping, pressure regulators, etc. Two such components are pictured: in the upper photo is a 22,300 kilowatt diesel prime mover and in the lower photo is a steam turbine rotor. Thermo Electron engineers analyze the needs of the customer and the parameters of the components to design a system of maximum efficiency, using a computer modeling system

to predict the fuel efficiency that would be achieved with different brands, sizes and models of boilers or turbines or piping.

One element of Thermo Electron's computer system is a software package called PRESTO (Performance of Regenerative Superheated Steam Turbine Cycles), supplied by NASA's Computer Software Management and Information Center (COSMIC). Developed by Lewis Research Center, PRESTO is flexible enough to handle the specifications for most energy systems and precise enough to give a realistic prediction of design efficiencies. An engineer can enter a manufacturer's specifications for different models of a turbine, for example, and check the effect of each model on system efficiency quickly and accurately. PRESTO is not the only program that can perform such calculations, but alternative software was much more expensive. Thermo Electron estimates savings on the order of $13,500 a year through use of PRESTO. ▲